CLEAN ENERGY & REGULATORY INTERVENTIONS FOR GREENHOUSE GAS EMISSION MITIGATION IN THE SRI LANKAN POWER SECTOR

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Abstract

Renewable Portfolio Standard (RPS) is rapidly emerging as a popular mechanism among policy makers to increase the penetration of renewable in the electricity markets, requiring the electricity supply industry to include a minimum level of electricity generation from renewable energy sources. Sri Lankan energy policy has set a target of 10% of grid electricity by 2015 to come from non-conventional energy sources (NCRE). Mini-hydro, biomass including dendro power and wind energy, which have been identified as the three leading, sustainable, non-conventional forms of renewable energy promoted in Sri Lanka for electricity generation to feed into the national grid.

The present installed capacity of grid-connected non-conventional renewable energy based electricity generation in Sri Lanka is around 100 MW and these plants are mainly connected to the primary distribution system. All these plants contribute to the nation's energy requirement generating only a small fraction of total generation amounting to approximately 2.5%. The longterm least-cost power generation expansion plan has given rise to the installation of oil-fired and coal-fired thermal plants to meet the increasing demand. This process does not give adequate consideration to the alternate supply-side options such as those based on NCRE.

The study presented in this thesis first investigates the impact of alternate generation options like NCRE based technologies, clean fuel options and reciprocating diesel engines with small capacities in the Sri Lankan power system considering Traditional Resource Planning based on minimizing total economic cost.

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The mam intention of this study IS to investigate technological and regulatory interventions especially the impact of the RPS of 10% on the least-cost power generation expansion plan of Sri Lanka considering available renewable technologies as supply-side options together with their technical potential and economic feasibility. The study also examines the impact of these interventions on overall

power sector emissions and. the greenhouse gas emissions- (GHG) in particular. The sensitivity of the outcomes of the 10%-.!3-PSto different supply side interventions are also presented in the thesis. It has been found that the 10% RPS target by 2015 can be achieved with an additional cost burden of US$ 57.25 million on the government. The results also show that mini hydropower is the best NCRE based technology which needs minimum financial incentives when achieving the target. Wind power and dendro power require substantial government incentives if they are to playa role in RPS.